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EXAMINER	
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1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/539,855	JUNG, PILL-HWAN	
	Examiner	**Art Unit**	
	LAUREN ROBINSON	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/18/2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/18/05*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

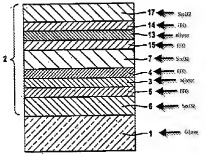
Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Paul et al. (WO 02/076901 A1).

Consider claim 1: Paul et al. teach a coated glass sheet (abstract) that can have the following structure (Figure 5, Pg. 13, lines 10-20):



From the above illustration it is seen that the coated glass sheet is comprised of a multilayer structure (2) formed on a glass substrate (1) and the multilayer structure is comprised of two layers of silver, at least three layers of ITO (5, 4, 15), and three layers of SnO2 dielectric layers (6, 7, 17). The reference also teaches that the silver layers 13 and 3 are formed in the structure to be in contact with the 4 ITO layer as a top and bottom layer for said ITO layer as illustrated above. This is also illustrated in Figure 4 in the reference.

Paul et al. also teach that while the ITO layers are preferably suboxides of indium tin (Pg. 4, lines 1-5), fully oxidized ITO layers have been formed in the structure (Pg. 3, lines 3-9, Pg. 5, lines 1-15 and Pg. 14, lines 5-15). The reference teaches that the above structure is used to shade IR light (Pg. 7, lines 5-15) and that the coatings having a refractive index at a wavelength of 380 nm (Pg. 10, lines 25-28). The examiner notes that it is known in the art that the above wavelength is in the ultraviolet region and since the coating has a refractive index in this region, then it is inherent that the coating would reflect, and therefore shade, light in the ultraviolet range **(Claim 1)**.

Consider claim 2 and 9: The reference also teaches that the dielectric layers can be comprised of any material suitable for the above coating purpose, such as tin oxide, titanium oxide, silica, alumina, etc. (Pg. 6, lines 20-25) **(Claim 2)**. Also, the examiner notes that the above multilayered structure applied to the glass substrate produces an overall coated glass sheet article **(Claim 9)**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 3, 5-8 are rejected under 35 U.S.C. 103(a) as being obvious over Paul et al. (WO 02/076901) as applied to claim 1.

Regarding claims 3 and 7: As discussed, Paul et al. teach a coated glass sheet for shading light with the characteristics set forth in applicants' claim 1. Also as discussed,

the dielectric layers can be silica, titanium oxide and/or alumina. However, the reference is *silent regarding the exact layered structure as claimed in claims 3 and 7 as well as the exact thickness and refractive index of each layer.*

Consider the structure as claimed in claims 3 and 7

While the reference does not specifically disclose the exact claimed structure in claims 3 and 7, they teach the following structure:

Glass / dielectric / ITO / Ag / ITO / dielectric / ITO / Ag / ITO/ dielectric

and as discussed, the dielectric layer can be silica which would produce the following:

Glass / SiO_2 / ITO / Ag / ITO / SnO_2 / ITO / Ag / ITO/ SiO_2

Also, the reference teaches that not all additional dielectric layers have to be present (Pg. 6, lines 20-31 and Pg. 7, lines 1-5) and that only one ITO layer need to be between each silver layer (Pg. 7, lines 20-30). Therefore, one of ordinary skill would recognize and find obvious that the removal of different dielectric layers and any secondary ITO layers between two silver layers could produce either of the two structures below would still being capable of shading IR and UV light:

(7 layers) Glass/ SiO_2 / ITO/ Ag / ITO / Ag / ITO / SiO_2

(6 layers) Glass / SiO_2 / ITO / Ag / ITO / Ag / ITO

Further, they teach that one could add additional dielectric layers of the above materials so that the dielectric layer and ITO can work in combination as antireflective layers for the silver (Pg. 6, lines 20-31).

The examiner notes that in Paul et al., they only require that the ITO layers are upper and lower embedding layers for the silver and while the above illustration and structures show direct contact of the ITO layers with said silver, there is no limitation regarding ITO being in “direct contact” with said silver. Therefore, it is the examiner’s position that if one desired to enhance the antireflection properties of the silver, then one of ordinary skill in the art would recognize and find obvious that additional dielectric layers could be added and combined with ITO, in any order, in order to enhance antireflection for the silver.

Due to the above teaching and reasoning, it is the examiner’s position that it would have been obvious to one of ordinary skill in the art at the time of invention to modify Paul et al. to include that the above 6 or 7 layer structures could be formed in order to shade IR and UV light and that additional dielectric layers comprised of any of the above mentioned dielectric materials (such as a titania layer to the 6 layer structure and two alumina layers to the 7 layer structure) can be added, in any order, in order to work in combination with the ITO layers and enhance the structure’s antireflection properties. This modification would in turn produce structures such as the applicants’ 7 layer structure as claimed in claim 3 of:

Substrate/ SiO_2/ ITO/ TiO_2 / Ag/ ITO/ Ag/ ITO

and, the applicants’ 9 layer structure as claimed in claim 7 of:

Substrate/ SiO_2/ ITO / Ag/ Al_2O_3 / ITO/ Ag/ Al_2O_3/ ITO/ SiO_2

<u>Consider the exact thickness and refractive index of each layer</u>

The reference discloses that the thickness of the silver layers will depend on desired optical properties (Pg. 7, lines 5-17). They teach that the thickness of the ITO embedding layers effects antireflection properties (Pg. 6, lines 20-32). Also, the reference teaches that the dielectric layers can vary in thickness (examples) and that the thickness of these layers is adjusted in order to work together with the ITO layers to impart antireflection (Pg. 6, lines 20-31).

From the above teaching, it is seen that the thickness of each layer is a result effective variable and it is known that by optimizing the thickness, the optical properties such as antireflection, etc. will change. Also, it is known in the art that refractive index is an optical property that changes with optimized thickness and will in turn change the manner in which reflection occurs. Therefore, if one desired specific optical results, one would know that the thickness and the refractive index, produced by the thickness, would need to be optimized and through routine experimentation, the desired properties can be obtained. As such, it would have been obvious to one with ordinary skill in the art at the time of invention to modify Paul et al. to include that the thickness and refractive index of each layer can be optimized to include any value, including applicants' claimed values, in order to produce desired optical results of the overall structure **(Claims 3 and 7)**.

Regarding claims 5-6: As discussed, Paul et al. teach a coated glass sheet for shading light with the characteristics set forth in applicants' claim 1. Also as discussed, the dielectric layers can be silica, titanium oxide and/or alumina. The reference also teaches that zirconia or tantalum oxide can be used as the dielectric layer (Pg. 6, lines 20-25).

However, the reference is *silent regarding the exact layered structure as claimed in claims 5 and 6 as well as the exact thickness and refractive index of each layer.*

Consider the exact layered structure as claimed in claims 5 and 6

While the reference does not specifically disclose the exact claimed structure in claims 5 and 6, they teach, as discussed, the structure as illustrated above which has the following sequence:

Glass / dielectric / ITO / Ag / ITO / dielectric / ITO / Ag / ITO/ dielectric

and as discussed, the dielectric layers can be any dielectric material taught which could produce the following:

Glass / SiO_2 / ITO / Ag / ITO / SnO_2 / ITO / Ag / ITO/ Ta_2O_5

or

Glass / SiO_2 / ITO / Ag / ITO / SnO_2 / ITO / Ag / ITO/ ZrO_2

Also as discussed, the reference teaches that not all additional dielectric layers and secondary ITO layers (two between the silver) have to be present (Pg. 6, lines 20-31 and Pg. 7, lines 1-5 and 20-30). Therefore, one of ordinary skill would recognize and find obvious that the following structures could be produced and be capable of shading IR and UV light:

Glass/ SiO_2 / ITO/ Ag / ITO / Ag / ITO / Ta_2O_5

or

Glass / SiO_2 / ITO / Ag / ITO / Ag / ITO/ ZrO_2

Further, they teach that while the ITO layers are the preferred embedding layers for thermally toughened and/or bent glass (Pg. 3, lines 10-20), they teach that zirconium

and tantalum oxide layers have been used in the above mentioned glass, in place of said ITO layers, in order to protect the silver layer in the presence of oxygen(Pg. 2, lines 8-25). Therefore, one of ordinary skill would recognize and find obvious that one or more of the ITO layers can be replaced by the above metals and the following structure could be produced:

Glass/ SiO_2 / ITO/ Ag / Tantalum oxide / Ag / ITO / Ta_2O_5

or

Glass / SiO_2 / ITO / Ag / zirconium oxide / Ag / ITO/ ZrO_2

Also, the examiner notes that since the embedding layers and the above oxides are thermally heated and present in an oxygen atmosphere within the reference (Pg. 2, lines 16-25, Pg. 3, lines 5-10), then it is inherent that if the above tantalum and zirconium oxides are used, the applicants' desired oxidation state would be present.

Further, the reference teaches that Ag/ITO layered series can be present on top of a previous ITO making the top ITO layer of a previous series, the bottom layer of an additional series (Pg. 7, lines 20-30). Also, they teach that the silver layer produces high light transmittance and low light-absorbance, while being IR reflective (Pg. 7, lines 5-15), and the ITO will be in combination to protect said silver as discussed. It is the examiner's position, from the above teaching, that one of ordinary skill in the art would recognize and find obvious that if one desired to enhance light transmittance, etc. in the structure, then an additional Ag/ITO combination series could be added and if added, could be present above a previous ITO layer.

Also, as discussed previously, the ITO layers do not have to be in direct contact with the silver and one of ordinary skill would recognize and find obvious that additional dielectric layers can be added, in any order, to the structure which could in turn, produce the following:

Glass/ SiO_2 / ITO/ Ag / Tantalum oxide / Ag / ITO / Ag/ Ta_2O_5/ ITO

or

Glass / SiO_2 / ITO / Ag / zirconium oxide / Ag / ITO/ Ag/ ITO/ ZrO_2

As illustrated, the first structure above is comprised of 8 layers, from silica to Ta_2O_5, and the second structure is comprised of a 7 layered structure, from Ag to ZrO_2, supported on an ITO layer substrate.

Due to the above teaching and reasoning, it is the examiner's position that while the claimed structures are not preferred or specifically disclosed in Paul et al., one of ordinary skill in the art would have recognized and found it obvious at the time of invention to modify Paul et al. to include that the above structures could be produced in order to obtain ultraviolet and IR shading characteristics, provide protection to the silver, and enhance the optical properties of the structure while **(Claims 5-6)**.

<u>Consider the exact thickness and refractive index of each layer</u>

As discussed above, the thickness and refractive indexes are result effective variables and therefore, the same reasoning above applies and it would have been obvious to one with ordinary skill in the art at the time of invention to modify Paul et al. to include that the thickness and refractive index of each layer can be optimized to

include any value, including ones claimed by the applicants, in order to produce desired optical properties for the overall structure **(Claims 5-6)**.

Regarding claim 8: As discussed, Paul et al. teach a coated glass sheet for shading light with the characteristics set forth in applicants' claim 1. However, they are silent regarding *the exact layered structure as claimed in claim 8 as well as the exact thickness and refractive index of each layer*.

Consider the exact layered structure

While the reference does not disclose the exact structure, they do disclose as discussed that the dielectric layers can be any material such as silica and/or alumina and still shade UV and IR light. Therefore, it would produce the following structure:

Glass / SiO_2 / ITO / Ag / ITO / SnO_2 / ITO / Ag / ITO/ Al_2O_3

and as discussed, not all the dielectric layers or ITO layers need be present and one would recognize that the structure below could be produced:

Glass / SiO_2 / ITO / Ag / ITO / Ag / ITO/ Al_2O_3

Also, as discussed, since one would recognize and find obvious that an additional Ag/ITO series can be added to any original ITO surface for the same reason as above, then the one would recognize that the following structure can be produced:

Glass / SiO_2 / ITO / Ag / ITO / Ag / ITO/ Ag/ ITO/ Al_2O_3

Further, due to the dielectric layers working in combination with the ITO to enhance antireflection properties as discussed, one would recognize that the following structure can be produced:

Glass / SiO_2 / ITO / Ag / ITO / Ag / ITO/ Ag/ Al_2O_3/ ITO/ Al_2O_3

And still further, the reference teaches that the ITO embedding layers have been known to also be replaced with aluminum oxide in order to protect the silver (Pg. 2, lines 8-25) and again, due to the same reasoning above, the following structure would be produced:

Glass / SiO_2 / ITO / Ag / aluminum oxide / Ag / ITO/ Ag/ Al_2O_3/ ITO/ Al_2O_3

which will inherently have the applicants' alumina oxidation state present.

From the above teaching it is illustrated that while the reference does not prefer or specifically disclosed in Paul et al., based on the prior art disclosure, one of ordinary skill in the art would have recognized and found it obvious at the time of invention to modify Paul et al. to include that the above structure could be produced in order to have ultraviolet and IR shading characteristics, provide protection to the silver, and enhance the optical properties of the overall structure **(Claim 8)**.

Consider the exact thickness and refractive index of each layer

As discussed above, the thickness and refractive indexes are result effective variables and therefore, the same reasoning above applies and it would have been obvious to one with ordinary skill in the art at the time of invention to modify Paul et al. to include that the thickness of each layer can be optimized to include any thickness and therefore, obtain any refractive index, in order to produce desired optical results of the overall structure **(Claim 8)**.

3. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being obvious over Paul et al. (WO 02/076901), in view of Nishihara et al. (US PN. 4,465,736).

As discussed, Paul et al. teach a coated glass sheet for shading light with the characteristics set forth in applicants' claim 1 and 2. They also teach that the coating provides solar control functions (Pg. 7, lines 5-8). However, they are *silent regarding the ultraviolet and infrared shading coating being used in the application of a window construction or safety glass wherein the coating is applied to one transparent glass pane with an additional transparent glass pane on top and then a plastic sheet is adhered between the panes to prevent shattering.*

Nishihara et al. teach film for shading light (title) such as infrared and ultraviolet light (Col. 1, lines 5-12) that is coated on a glass sheet (Col. 8, lines 17-25). They teach that the film can be used in a window construction, such as safety glass, in order to impart solar radiation controlling functions to car type windows (Col. 3, lines 30-35). The film in this reference is comprised of a multilayered structure comprising a thin layer of silver metal that can have a layer of indium tin oxide applied to both sides of said silver (Col. 6, lines 45-50). Also, the reference teaches that one or more dielectric layers can be applied to both sides of the silver (Col. 3, lines 35-45) wherein the dielectric layers can be comprised of indium oxide, titanium oxide, silica, etc. (Col. 3, lines 20-30).

Further, they teach that when used as safety glass, the window construction will be comprised of two transparent glass sheets (Col. 1, lines 25-30, Col. 4, lines 25-35, Col.8, lines 18-35) wherein the infrared and ultraviolet shading film (optical coating) is in between both sheets (Col. 8, lines 15-20). They also teach that the film is comprised of a plastic layer sheet material used as a carrier film of PET (Col. 2, lines 1-5, Col. 3, lines 64-67 and Claim 2). As illustrated in column 6, lines 40-42, if two glass sheets are

applied to both sides of the above overall film, then the optical portion comprising silver, whatever dielectric chosen (such as indium tin oxide), etc would inherently be formed on at least one glass sheet against the plastic PET layer. Also, the reference teaches that the carrier film is adhered in the overall film (Col. 5, lines 13-20) and therefore, in between both sheets as well. Further, the reference discusses that shattering in windows (panes) is known (Col. 1, lines 15-20) but is vanished in this invention due to enhancement of the heat shrinkage caused by the addition of said carrier film (Col. 2, lines 1-40 and Col. 4, lines 1-35). Therefore, it is the examiner's position that it is inherent that the resistance to shattering was produced by the plastic layer.

Paul et al. and Nishihara et al. disclose analogous inventions regarding a multilayered structure film comprised of a silver layer with dielectric layers and indium tin oxide applied to both sides (illustrated by Paul et al. in the figure above) wherein the film imparts solar control functions and shades ultraviolet and infrared light. Also, both references teach that the film can be applied to glass substrates. As such, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Paul et al. to include that it would be advantageous to use the ultraviolet and infrared shading multilayered film structure coated on the glass sheet in a window construction, such as a safety glass window construction comprised of two glass sheets and a plastic material laminated in the manner taught by Nishihara et al., in order to impart solar control functions to car windows while preventing shattering to the glass panes **(Claims 10-13)**.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being obvious over Paul et al. (WO 02/076901 A1) as applied to claims 1 and 5 above, in view of Phillips et al. (US Publication No. 2002/0182383).

As discussed, Paul et al. discloses a multilayer structure on a glass substrate with the limitations of claim 1. Also as discussed, one would recognize and find obvious for the same reasoning as disclosed above for claim 5, that the multilayer structure can be comprised of the following:

Glass / SnO2 / ITO / Ag / ITO / Ag / ITO/Ag/ ITO/ SnO2

However, the reference is still *silent with regard to the exact structure of claim 4 with the layers having the claimed thicknesses and refractive index.*

Phillips et al. teach a multilayered coating formed on a substrate (abstract, Par. 0007, Figures). They teach that the multilayer structure is comprised of a reflective silver layer (Par. 0073) with opposing dielectric layers above and below the silver layers (Figures) to aid in corrosion resistance, etc. (Par. 0074). They teach that the dielectric layers can be tin oxide, yttrium oxide, or indium-tin-oxide due to the high refractive index of these materials (Par. 0078).

Consider the exact structure of claim 4

Paul et al. and Phillips et al. disclose analogous inventions related to a multilayered coating on a substrate wherein the coating is comprised of a silver layer embedded by a top and bottom dielectric layer. The examiner notes that the sole purpose of Phillips et al. is to illustrate that yttrium oxide is a functional equivalent of indium-tin-oxide and tin oxide as they all function as high refractive index dielectric

layers and yttrium oxide can be used as embedding layers to protect the silver layer from corrosion. As such, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Paul et al. to include that yttrium oxide can be used in place of a layer of tin oxide to act as an equivalent high refractive index dielectric layer in the structure and yttrium oxide can replace a layer of ITO to act as an equivalent high refractive index layer embedding a silver layer in order to resist corrosion and provide antireflection in the structure. This could then provide the following structure wherein the first ITO layer is a substrate for the multilayer stack above it.

Glass/SnO_2 / Ag/ Y_2O_3 / Ag / ITO / Ag / ITO/ Y_2O_3

Consider the claimed thicknesses and refractive index

While the reference is silent regarding the exact thickness and refractive index of the individual layers, these limitations are result effective variables for the same reasoning as given above and it would have been obvious to one of ordinary skill in the art at the time of invention to modify the thickness of the layers which will also modify the refractive index of each layer in order to produce desired optical results of the overall multilayered structure **(Claim 4)**.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAUREN ROBINSON whose telephone number is (571)270-3474. The examiner can normally be reached on Monday to Thursday 6am to 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on 571-2721284. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Lauren E. T. Robinson
Examiner
AU 1794

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